

The Challenge of Developing a Sustainable Water Supply for Broward County

Broward Leaders Water Academy
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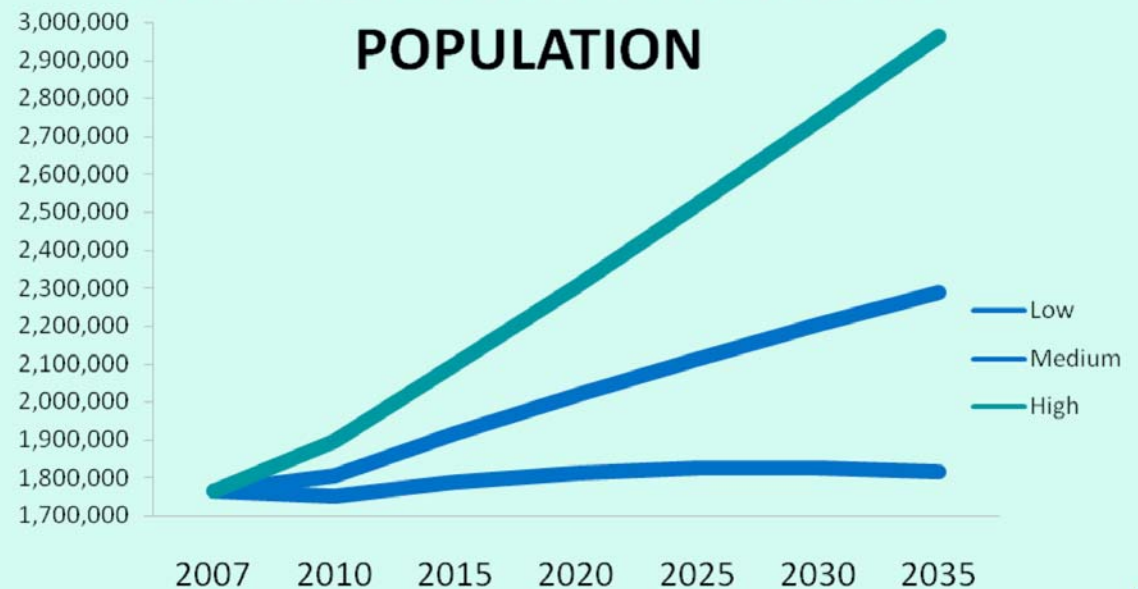
What is the Definition of a Sustainable Water Supply?

Sustainable water supply is development of water supply that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Major Challenges to a Sustainable Water Supply for Broward County

- Population Growth
- Global Climate Change

BROWARD COUNTY PROJECTED POPULATION

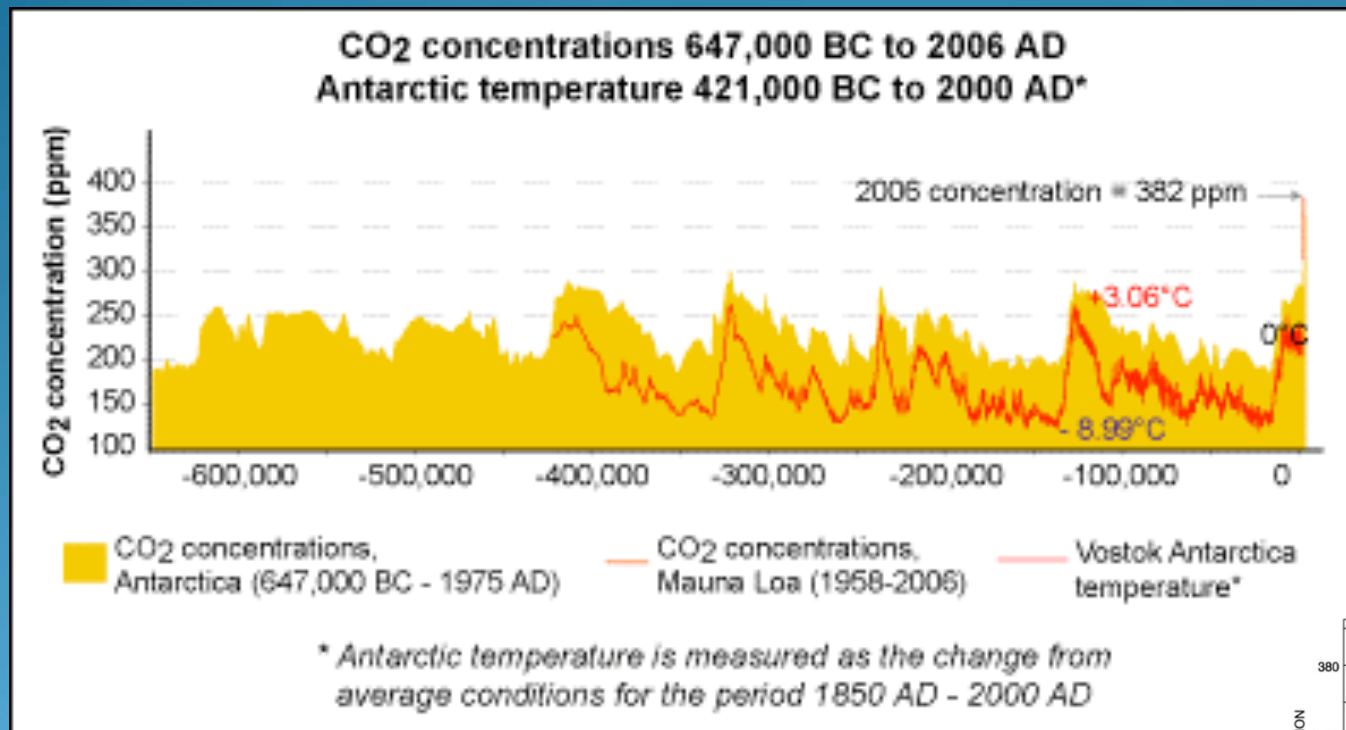


Climate Change is a Global Phenomenon That Will Seriously Impact Broward County

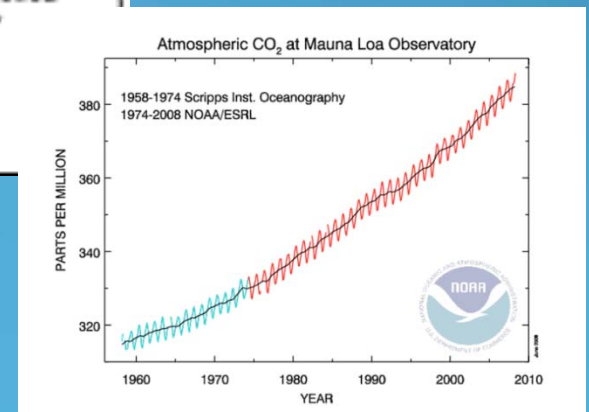
- Flooding
- Declining water supply
- Saltwater intrusion
- Rainfall Changes
- Hurricanes
- Ecosystem changes



Global Greenhouse Gas Production Portends a Non-Sustainable Future



Carbon dioxide increasing at 2 ppm/year



Source: www.epa.gov/climatechange; <http://www.esrl.noaa.gov/gmd/ccgg/trends>

Global Temperatures are Rising

IPCC (1995):

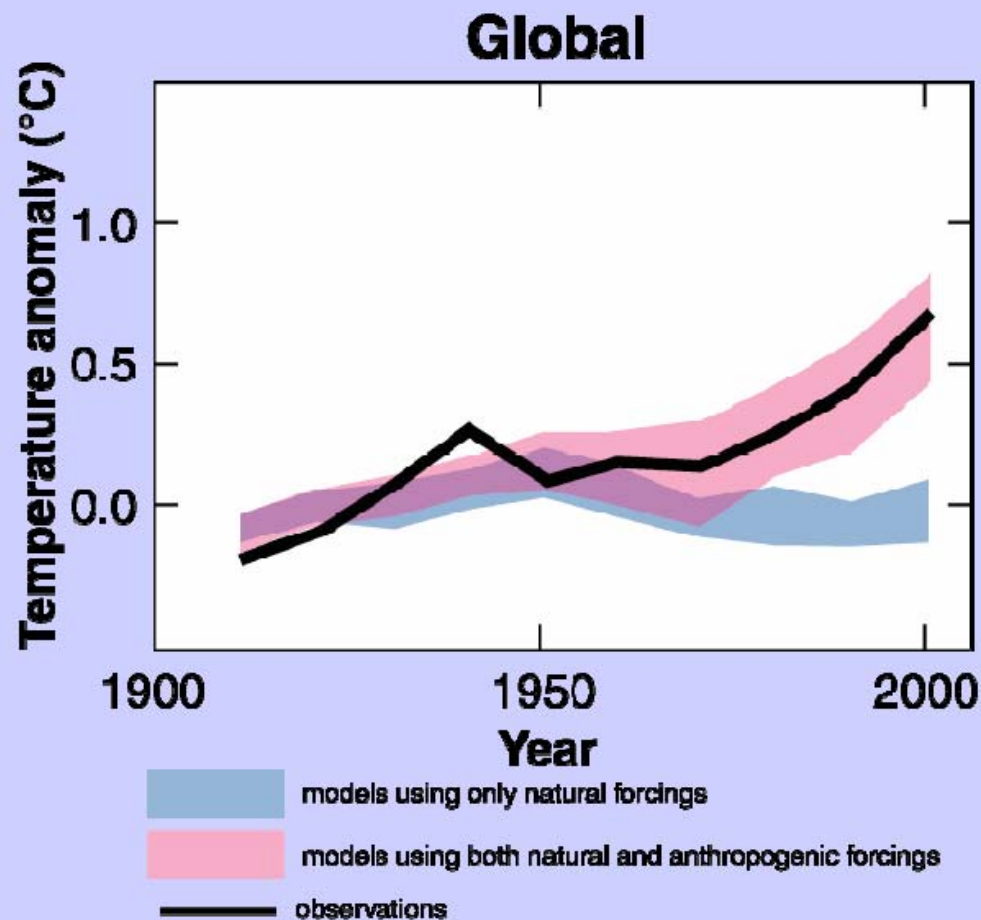
“Balance of evidence suggests discernible human influence”

IPCC (2001):

“Most of warming of past 50 years *likely* (odds 2 out of 3) due to human activities”

IPCC (2007):

“Most of warming very *likely* (odds 9 out of 10) due to greenhouse gases”



Glaciers Around the World are in Retreat



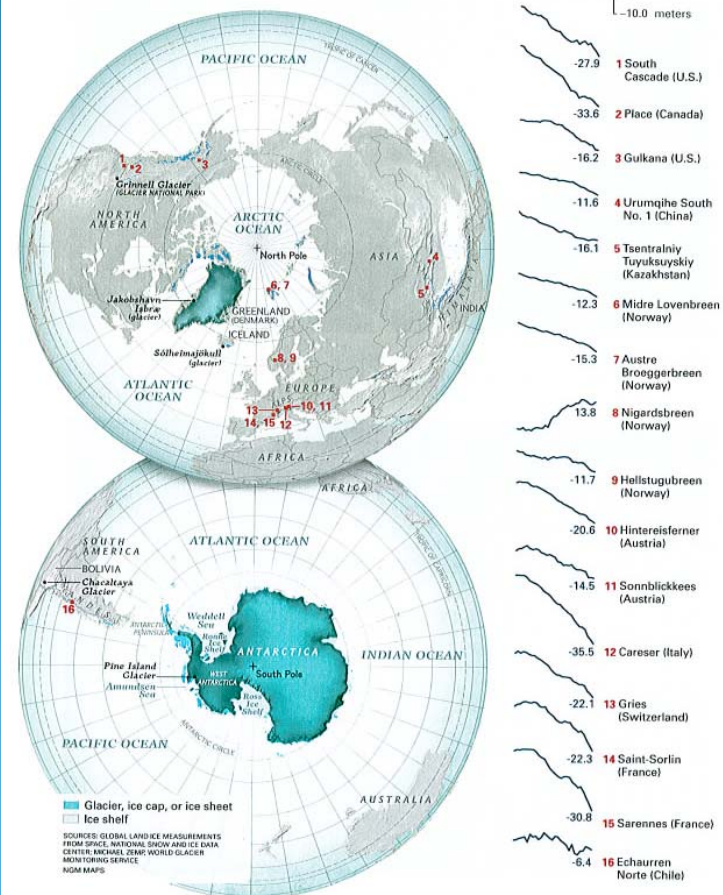
Glacier AX010, Nepal
1978



Glacier AX010, Nepal
2004

A Global Retreat

Ice is on the run in its mountain and polar strongholds. As the ice sheets on Greenland and Antarctica shrink in the next few centuries, seas could rise 20 feet. (Floating sea ice, also dwindling, does not affect sea level.) The shrinkage of mountain glaciers (chart) will dry up rivers and alter landscapes.



Source: National Geographic Magazine

Greenland is Melting (2007)

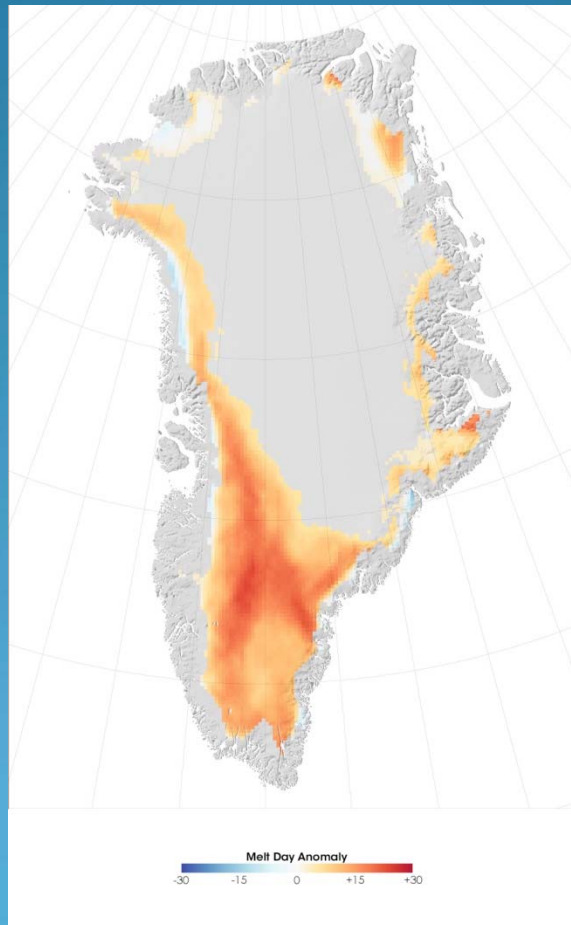


Image reflects the difference between the number of melting days occurring in 2007 and the average number of melting days during the period 1988 – 2006.

http://www.nasa.gov/vision/earth/environment/greenland_recordhigh.html

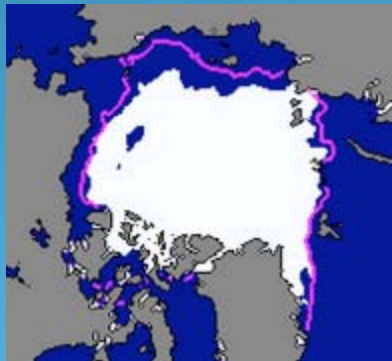
The Arctic Ice Cap is Disappearing



September 2002



September 2005



September 2006



September 2007



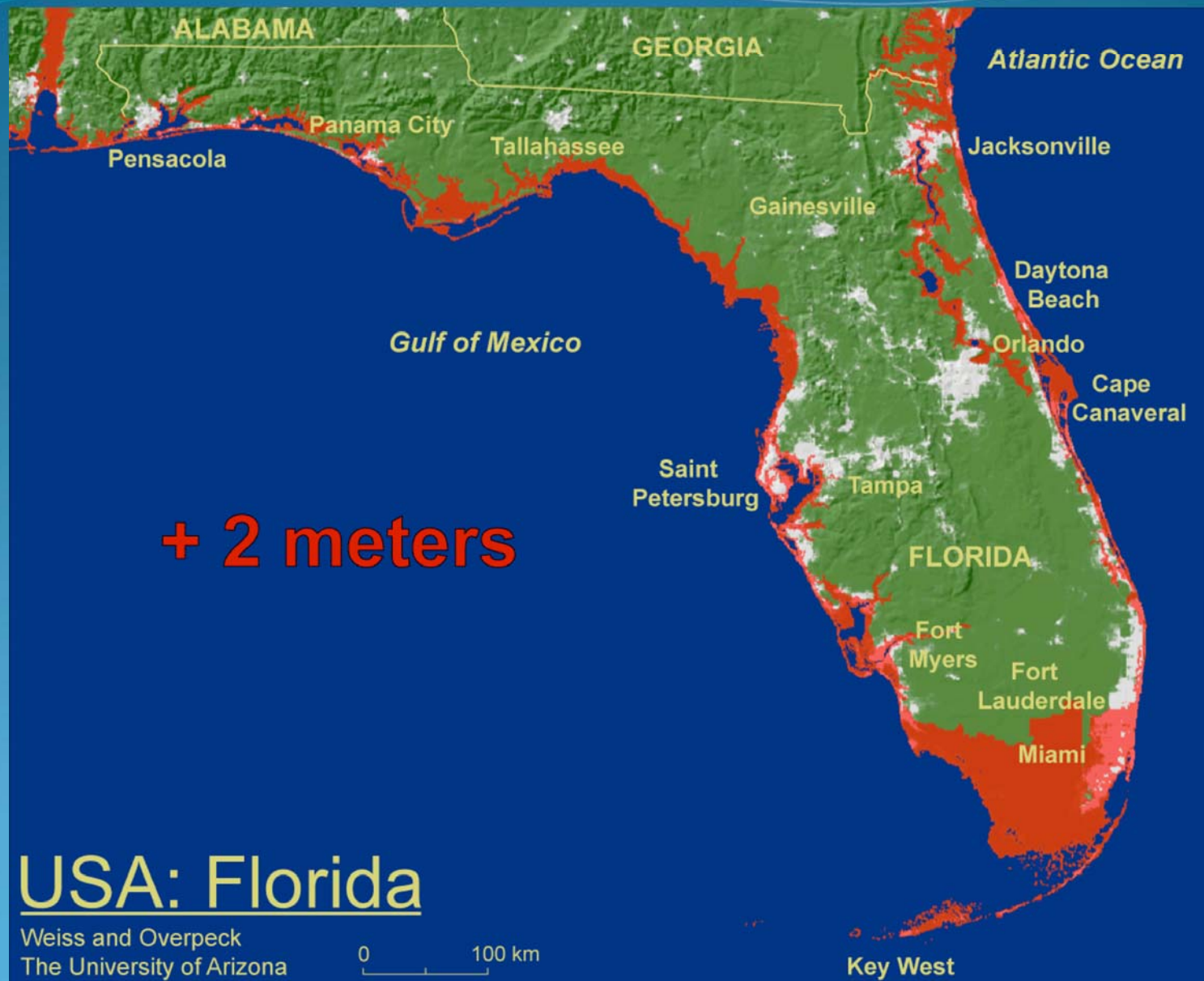
Source: National Snow and Ice Data Center; 1979-2000 average extent.

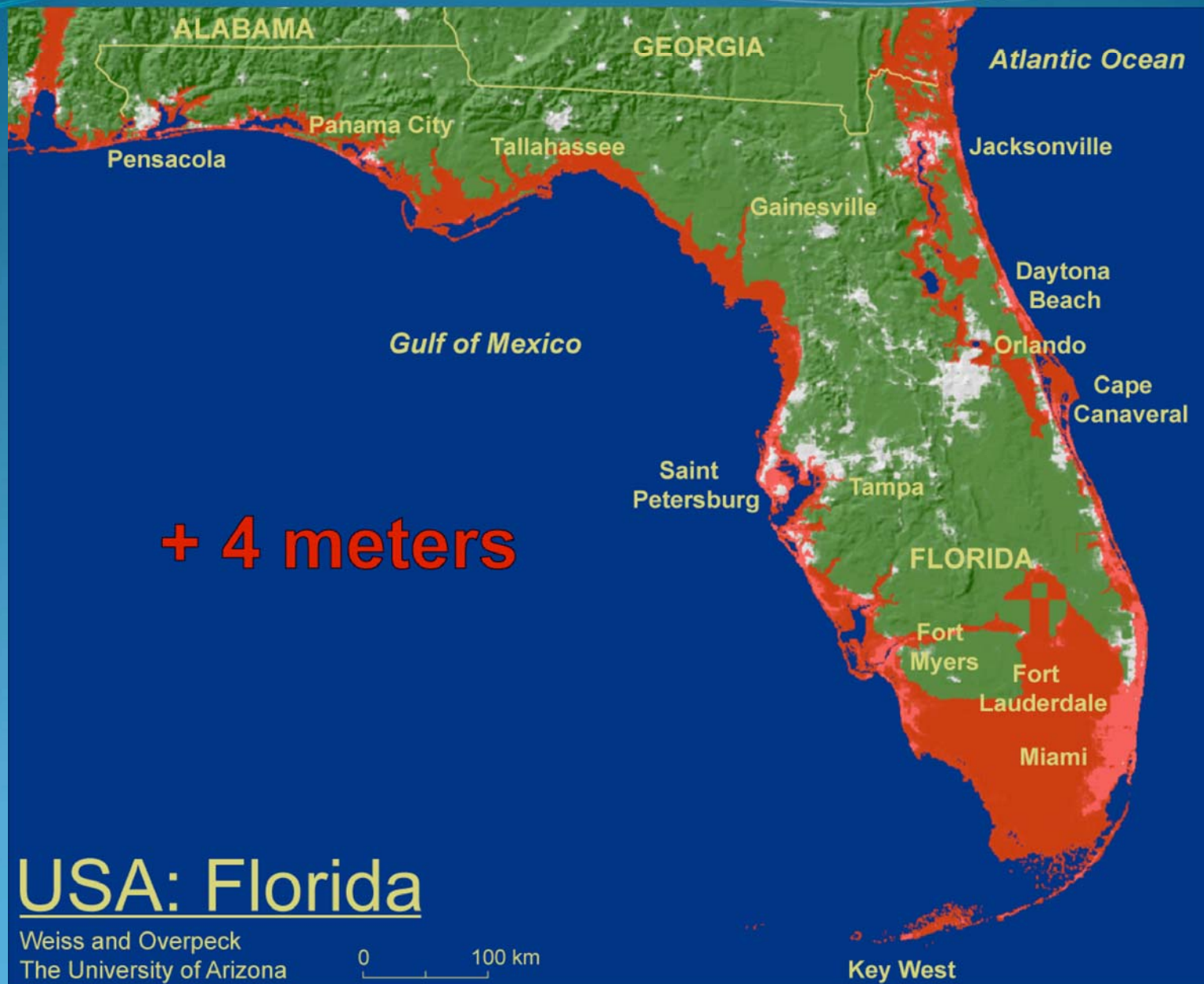
Miami-Dade County's Climate Change Task Force Recognized the Potential for Major Changes

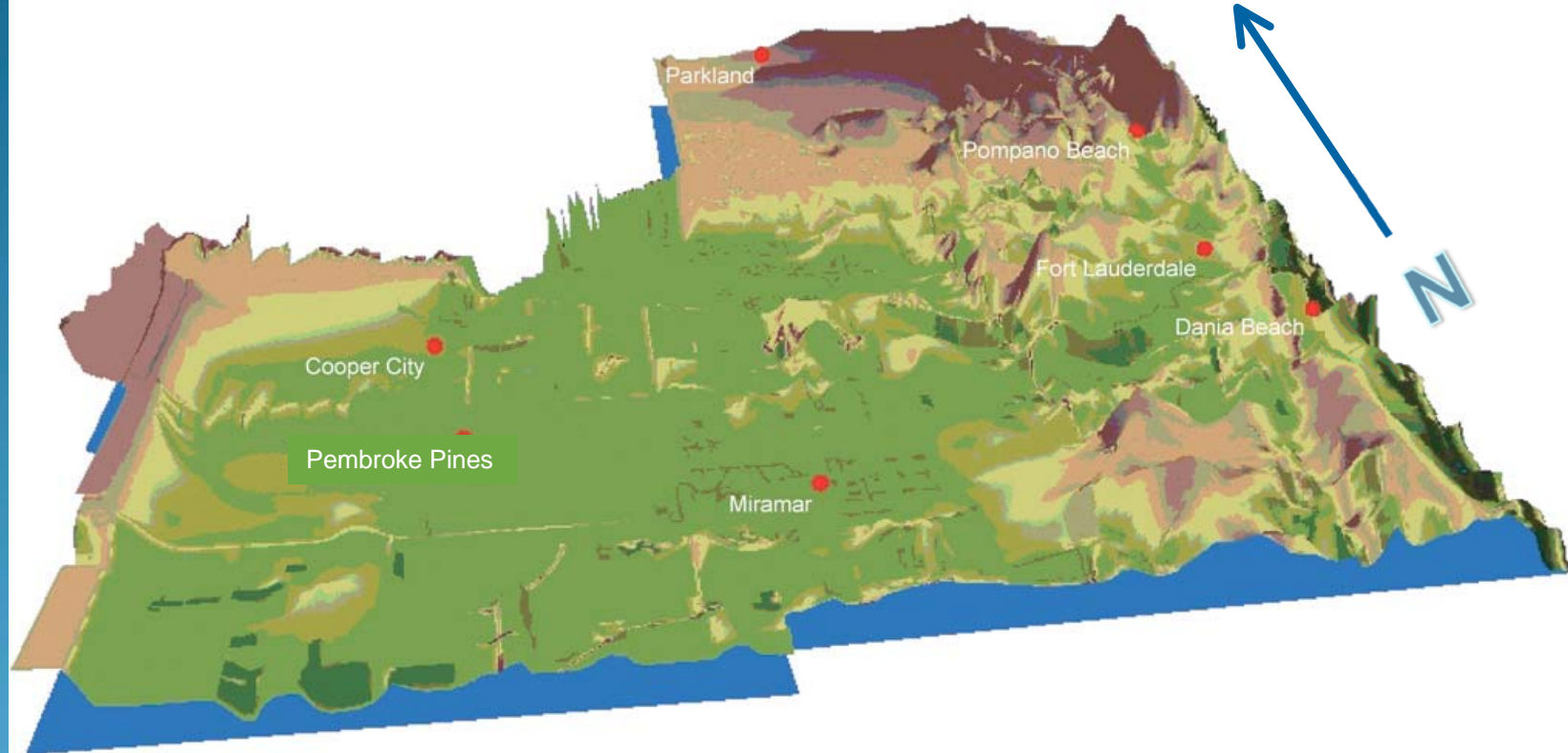
“With what is happening in the Arctic and Greenland, many respected scientists now see a likely sea level rise of **at least 1.5 feet in the coming 50 years and a total of at least 3-5 feet by the end of the century, possibly significantly more**”

Miami-Dade County Climate Change Task Force. January 17, 2008



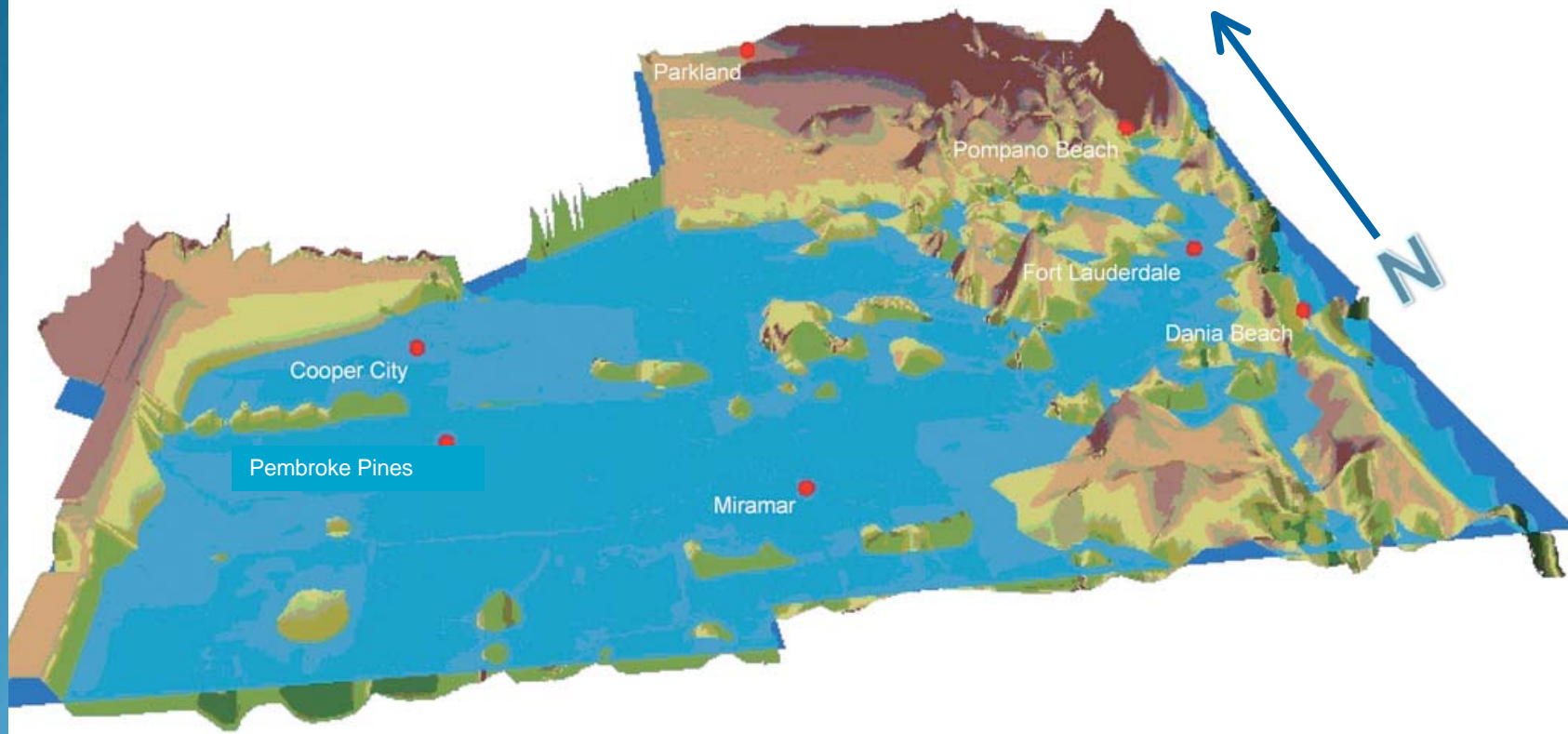






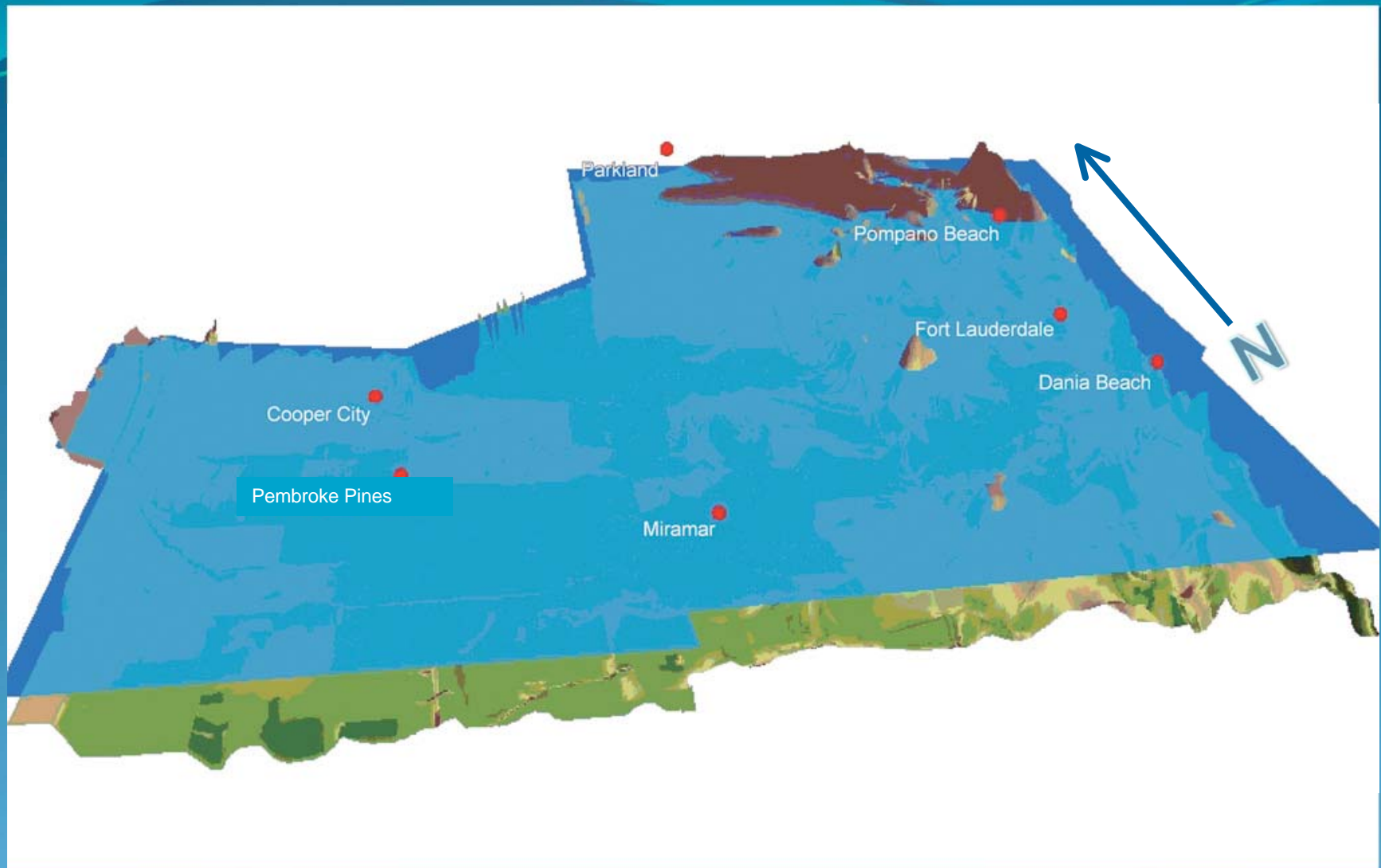
Modern Broward County Sea Level

http://www.esri.com/mapmuseum/mapbook_gallery/volume23/environmental3.html; Image created by Kimberly Forkner using USGS satellite images; 7th Annual Project Symposium, May 18, 2007, College of Engineering Presentations, CalPoly, Pomona, CA.



2 Meter Sea Level rise

http://www.esri.com/mapmuseum/mapbook_gallery/volume23/environmental3.html; Image created by Kimberly Forkner using USGS satellite images; 7th Annual Project Symposium, May 18, 2007, College of Engineering Presentations, CalPoly, Pomona, CA.



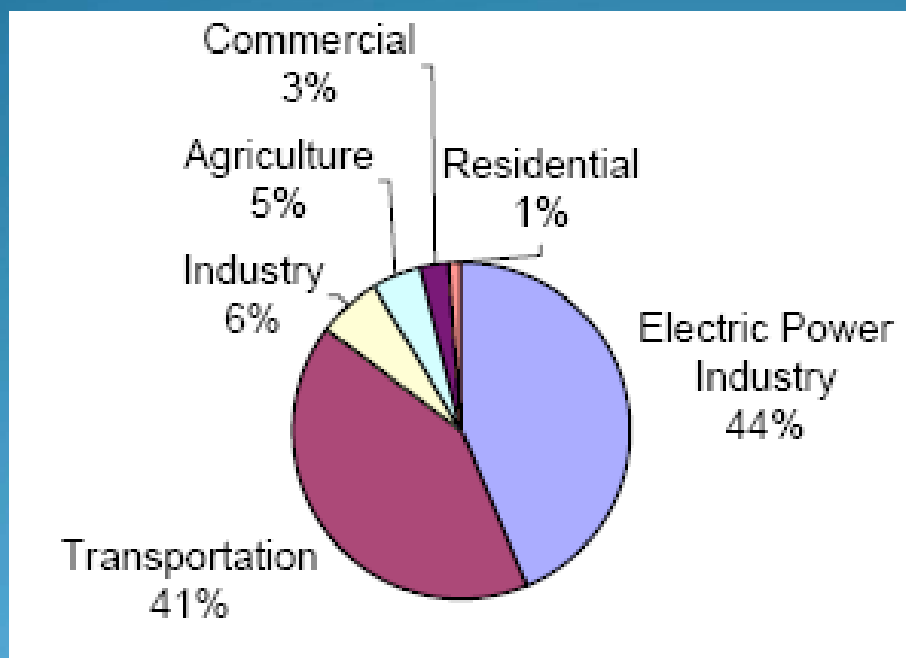
4 Meter Sea Level Rise

http://www.esri.com/mapmuseum/mapbook_gallery/volume23/environmental3.html; Image created by Kimberly Forkner using USGS satellite images; 7th Annual Project Symposium, May 18, 2007, College of Engineering Presentations, CalPoly, Pomona, CA.

Is Climate Change Inevitable?

- No, but extremely difficult to overcome....
 - Is it likely the United States and the nations of the world will cooperate?

Florida Produces 1% of Global Greenhouse Gas Emissions

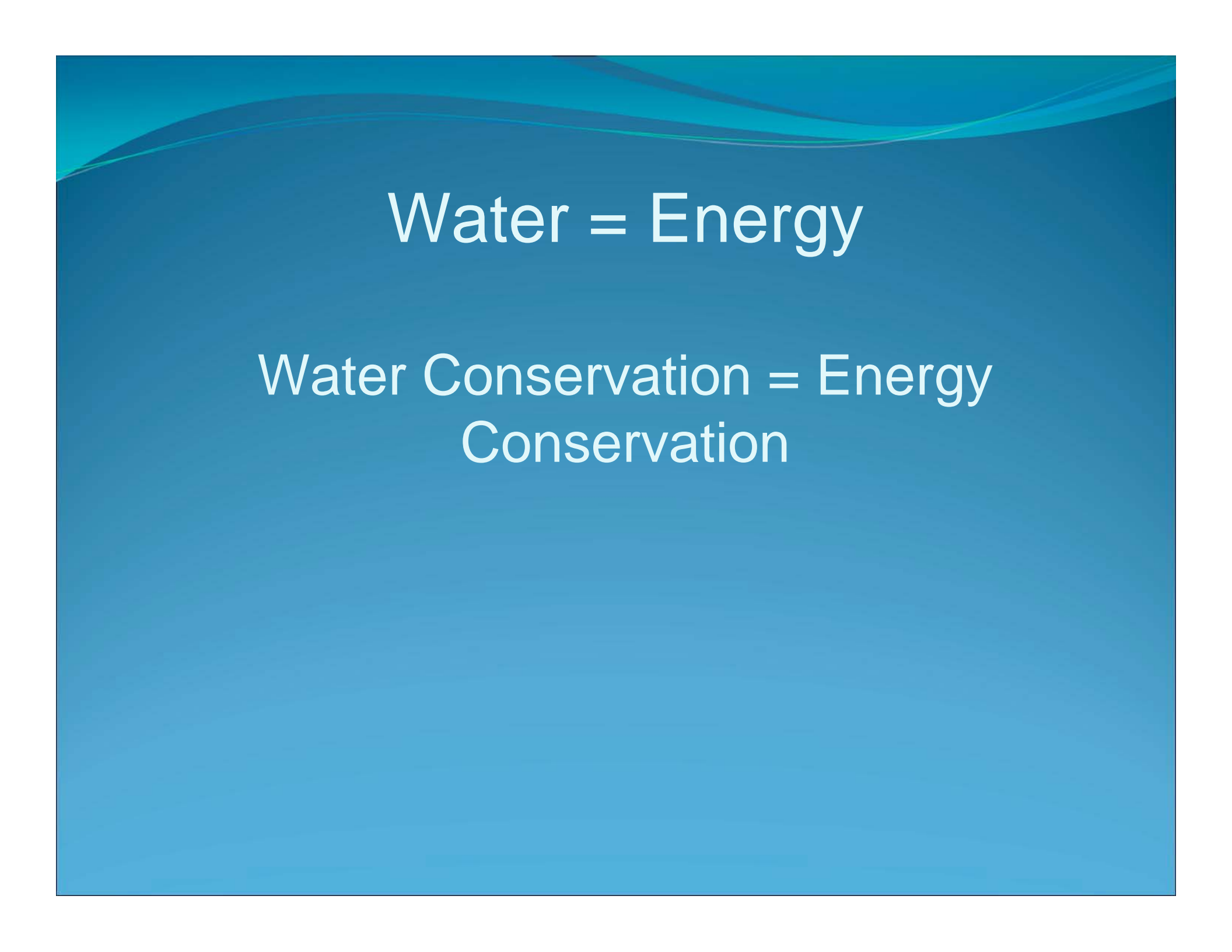


Florida GHG Emissions in 2005 by Economic Sector

- ◆ FL GHG Emissions ~5% of U.S. Total (7,260.4 Tg CO₂ Equiv. in 2005); FL was about 6% of U.S. population

Florida (Including Broward County) Requires Reinvention

- We must reduce our energy consumption from fossil fuels
- To stabilize CO₂ levels need to reduce emissions at least by 80% by 2050
- Executive Orders by Arnold Schwarzenegger and Charlie Crist Agree

The background of the slide is a solid blue color with a wavy, undulating pattern at the top, resembling a horizon or water surface. The waves are in shades of light blue and teal, creating a sense of movement and depth.

Water = Energy

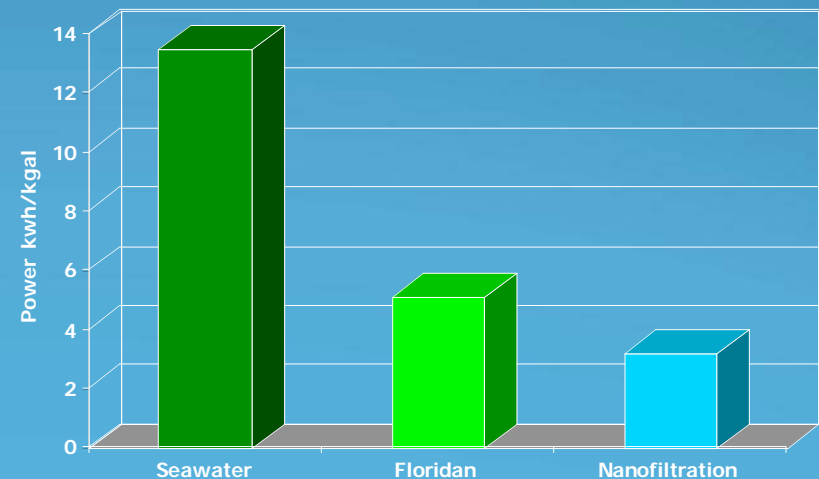
Water Conservation = Energy
Conservation

How Will Water Demands Be Met In The Future

- WATER CONSERVATION
- Moving wellfields inland
- Maximizing use of the Floridan aquifer
- Seawater RO
- Maximizing reclaimed water

Energy Conservation in Water Supply Is Necessary But...We Have a Dilemma

- New treatment technologies use more energy
 - Lime Softening – circa 1 kwh/1000 gallons
 - Nanofiltration – 3 kwh/1000 gallons
 - LPRO (Floridan) – 5 kwh/1000 gallons
 - Seawater RO – 15 kwh/1000 gallons



Water Supply Will Require “GREEN” Designs with Distributed Sources of Energy

- Energy conservation-more efficient pumps, energy recovery
- Incorporation of alternative energies
 - Solar
 - wind
 - Digester gas
 - Landfill gas
 - Waste to Energy
- LEED Buildings
- Net metering



Water and Energy Conservation, Green Energy and Nuclear Are Major Solutions to Greenhouse Gas Emissions

- Conservation is a COMMUNITY EFFORT
- Local Government's role is key in promoting solutions
- The selection of fuel sources by power providers will have huge impact



The background of the slide is a solid blue color with a subtle, wavy pattern at the top, creating a sense of movement or depth. The waves are in shades of light blue and white, flowing from left to right.

Questions?